WOLFVILLE 6-MONTH PUMPING TEST

Kings County, Nova Scotia

By

Peter C. Trescott, Groundwater Geologist
Groundwater Section, N. S. Department of Mines

February 13, 1970

Wolfville 6-Month Pumping Test

Hydrology

The 6-month pumping test of the Wolfville aquifer was terminated on January 20, 1970. The test included (1) a test from July 23 to August 19, 1969 at 254 Imp. gpm; (2) recovery to August 21; (3) a period from August 21 to November 19 when water was pumped into the town water system at ± 160 Imp. gpm; and (4) a period from November 19 to the termination of the test when the well was pumped to open discharge at 320 Imp. gpm. The variability of the pumping rate during the 6-month period is reflected in the hydrographs of the observation wells and the pumping well. The records for the pumping well from August 21 to December 29, 1969 were lost by the Town of Wolfville, but the water-level trend in this well undoubtedly was similar to the water-level trends as observed in the nearby observation wells which have automatic recorders.

The gradual decline in water levels from July to the end of October 1969 can be attributed to the natural water-table recession which was observed to be about 2 feet for this period in a similar aquifer at Coldbrook. The water table in the aquifer at Coldbrook remained nearly constant from the first of November to December 22, but water levels near the pumping well at Wolfville declined about a foot due to the increase in pumping rate from about 160 to 320 Imp. gpm. The water table at Coldbrook recovered 2 feet during the last month of the test, but this recovery is not reflected in the hydrographs of the wells at Wolfville. It is possible that an increase in water levels would not have occurred under natural conditions at Wolfville during this period, but normally, when a significant increase in water levels occurs, it occurs throughout the region at about the same time (see Trescott, 1970). If it is assumed (based on the water level records for Coldbrook) that the water level under natural conditions would have been the same at the end as at the beginning of the test period, then the water level decline in the aquifer due to pumping was about 2 feet. Such a rate of decline, if it were to continue indefinitely while the aquifer was being pumped, would be cause for concern because a permanent lowering of the water table of ten or more feet might cause salt-water intrusion. (This is the pessimistic view.) On the other hand, except for the lack of recovery at the end of December, the pumping water level appeared to stabilize (taking into account the natural water table recession) after a week of pumping at each rate. Furthermore, the water levels should recover [illegible]ificantly in the spring and in all likelihood to the level they would have reached [illegible] the pumping test had not occurred.

Chemistry

The illustration showing the hydrograph of the pumping well also includes a plot of the chloride concentration of water samples taken periodically from the pumping well. The trend has been a gradual increase in chloride concentration from 8-9 ppm to

15-16 ppm. Since October, however, the rate of increase has been more gradual. As noted previously (Trescott, 1969), the chloride concentration eventually should approach that of the principal source of recharge — the underlying Triassic sandstones in which groundwater commonly contains a chloride concentration of 20-30 ppm (see the analyses in Trescott, 1968). In the spring, recharge from rain and melting snow temporarily may reduce the chloride concentration each year.

Conclusions

1. The Town of Wolfville should be able to obtain all of its water requirements from the sand and gravel aquifer that underlies the town.

2. The 6-month test has not demonstrated that a long-term lowering of water levels will occur once the aquifer is developed. This can be determined only after several years of records are compared to water-level records in similar aquifers elsewhere.

3. The gradual increase in the chloride concentration of water produced during the test does not indicate salt-water intrusion, only increasing contribution from the Triassic rocks. If the chloride concentration exceeds 40 or 50 ppm, then salt-water intrusion may be affecting the water quality.

4. As suggested in previous reports, an observation well should be constructed near Wolfville Harbour to monitor groundwater quality and the water table. Salt-water intrusion will occur here first, if it occurs at all.

References Cited

Trescott, P. C., 1968, Groundwater resources and hydrogeology of the Annapolis-Cornwallis Valley, Nova Scotia: N. S. Dept. of Mines, Memoir 6, 159 pp.

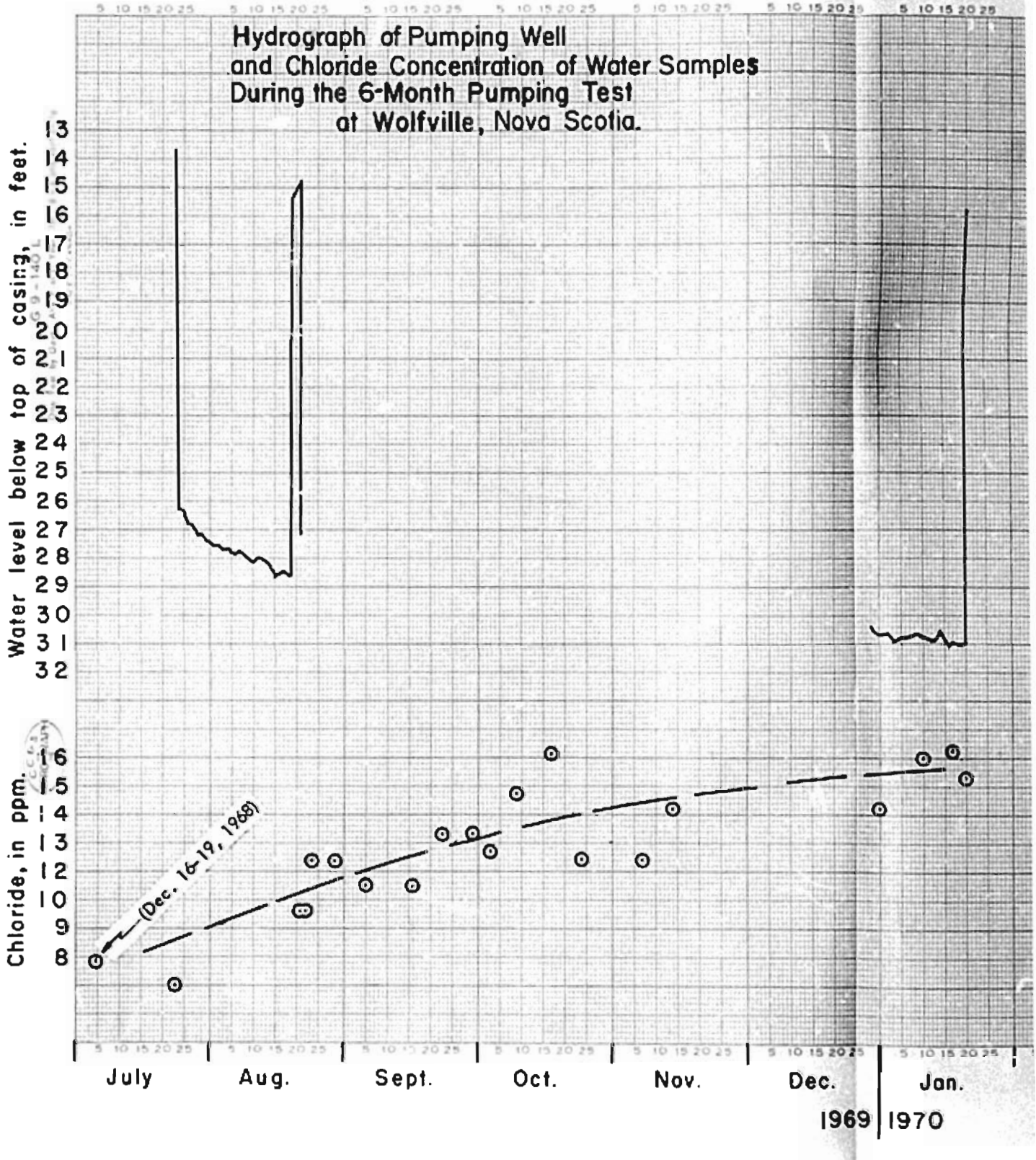
_____, Sept. 29, 1969, Wolfville Aquifer Evaluation, Kings County, Nova Scotia: N. S. Dept. of Mines report to the Town of Wolfville.

_____, 1970, Piezometer nests and the groundwater flow system near Berwick, Kings County, Nova Scotia: N. S. Dept. of Mines, Groundwater Section Rept. 70-1 (in press).

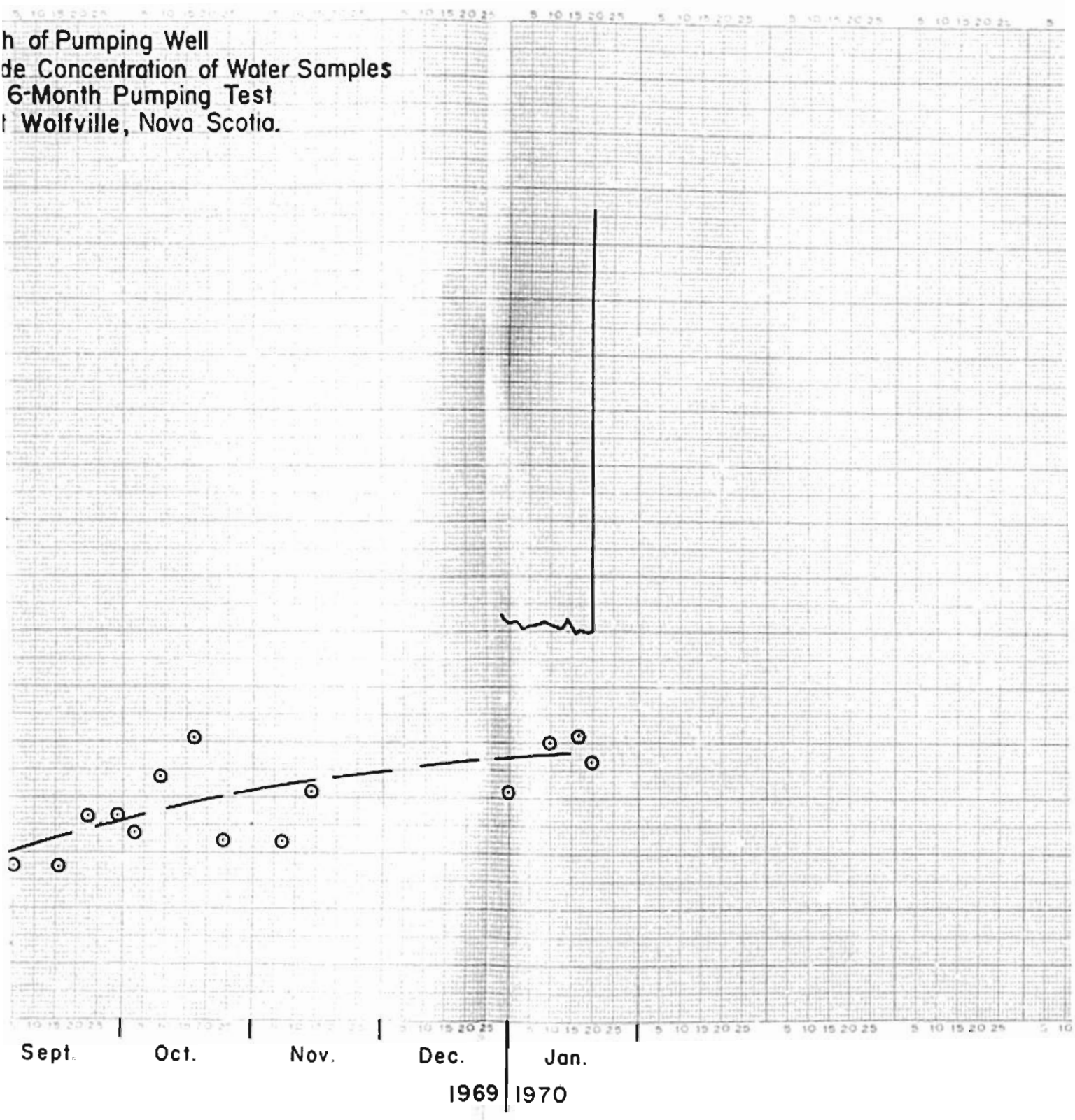
Peter C. Trescott

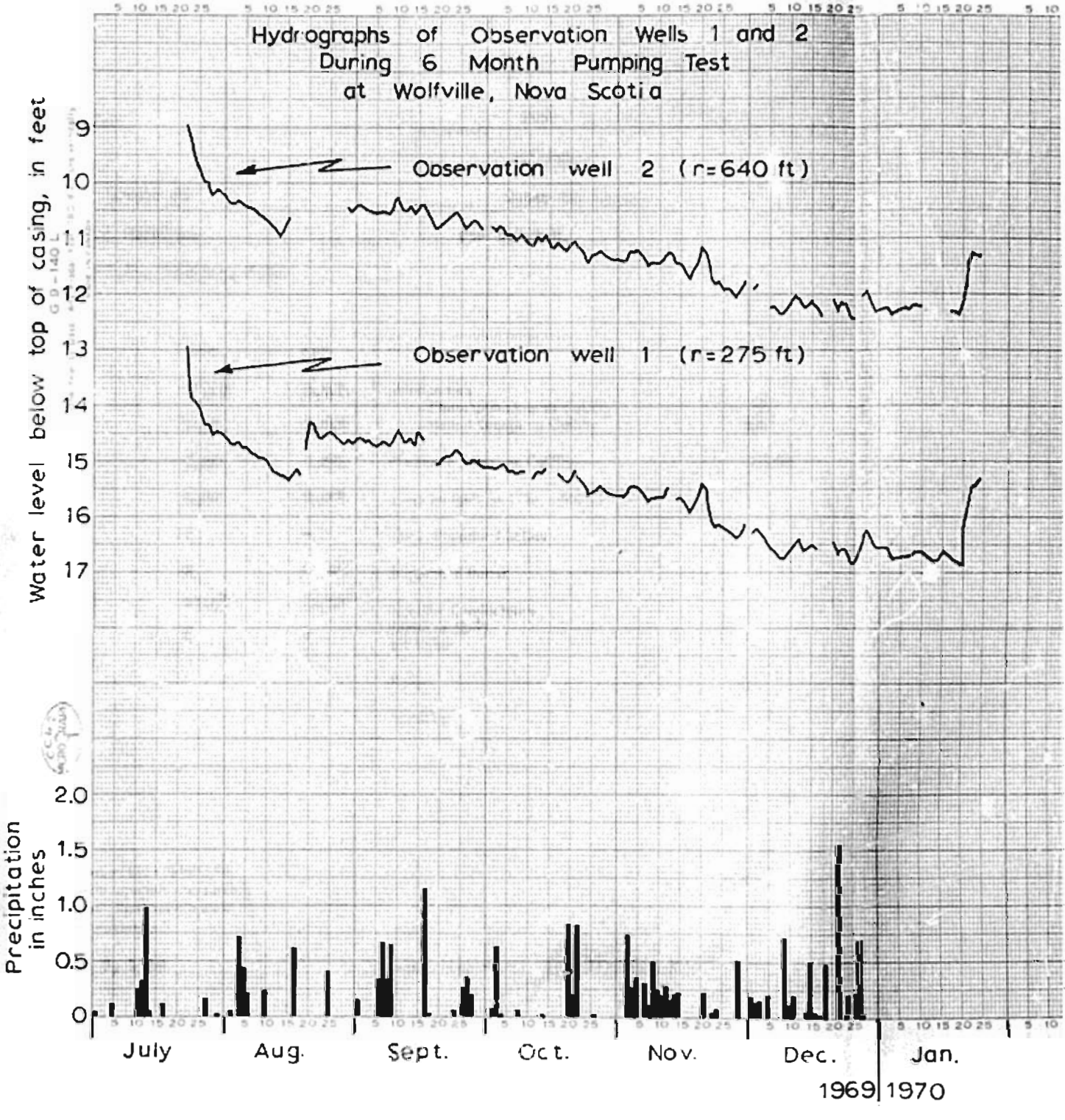
Peter C. Trescott
Groundwater Geologist

February 13, 1970
Halifax, Nova Scotia


Hydrograph of Pumping Well
and Chloride Concentration of Water Samples
During the 6-Month Pumping Test
at Wolfville, Nova Scotia.
Water level below top of casing, in feet.
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
Chloride, in ppm.
16
15
14
13
12
10
9
8
(Dec. 16-19, 1968)
5 10 15 20 25
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.
1969
1970

h of Pumping Well
de Concentration of Water Samples
6-Month Pumping Test
t Wolfville, Nova Scotia.




Hydrographs of Observation Wells 1 and 2
During 6 Month Pumping Test
at Wolfville, Nova Scotia
Water level below top of casing, in feet
9
10
11
12
13
14
15
16
17
Observation well 2 (r=640 ft)
Observation well 1 (r=275 ft)
Precipitation in inches
2.0
1.5
1.0
0.5
0
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.
1969
1970

46044/1

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Wolfville

DATE SAMPLED: Sept. 5, 1969 - 8:20 A.M.

DATE RECEIVED: 6/10/69

IDENTIFICATION MARK: Sample #1

SAMPLED BY: Keith Davidson

SUBMITTED BY: T.W. Henniger for N.S.D.M.

Box 1087, N.S.D.M., Halifax, N.S.

	ppm	epm		
Calcium	18.12	0.904	Alkalinities	
			-Phenolphthalein as $CaCO_3$	0
Magnesium	7.39	0.608	-Methyl Orange as $CaCO_3$	48
Sodium	5.85	0.254	Hardness (Total as $CaCO_3$)	75.60
Iron Total	0.02	0.001	Loss on Ignition (1 hr. @ 500°C)	
Manganese Total	T	-	Total Dissolved Solids	
Sulphate	8	0.167	Suspended Matter	
Chloride	11.52	0.325	Specific Conductance (mhos. x 10^{-5})	18
Nitrate	T	-	pH Value	7.1
			Color	<5
			Turbidity	0

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: Oct. 8, 1969

ANALYSED BY: J.B. Harnish

46044/2

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Wolfville

DATE SAMPLED: Sept. 16, 1969 - 10:00 A.M.

DATE RECEIVED: 6/10/69

IDENTIFICATION MARK: #2

SAMPLED BY: Keith Davidson

SUBMITTED BY: T.W. Hennigar

for N.S.D.M.

Box 1087, N.S.D.M., Halifax, N.S.

	ppm	epm		
Calcium	17.47	0.872	Alkalinities -Phenolphthalein as $CaCO_3$ -Methyl Orange as $CaCO_3$	 0 48
Magnesium	7.69	0.633		
Sodium	5.78	0.251	Hardness (Total as $CaCO_3$)	75.20
Iron Total	0.02	0.001	Loss on Ignition (1 hr. @500°C)	
Manganese Total	T	-	Total Dissolved Solids	
Sulphate	8	0.167	Suspended Matter	
Chloride	11.52	0.325	Specific Conductance (mhos. x 10^{-5})	18
Nitrate	T	-	pH Value	7.1
			Color	<5
			Turbidity	1

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: Oct. 8, 1969

ANALYSED BY: J B Harnish

L6044/3

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Wolfville

DATE SAMPLED: Sept. 23, 1969 - 10:00 A.M.

DATE RECEIVED: 6/10/69

IDENTIFICATION MARK: #3

SAMPLED BY: Keith Davidson

SUBMITTED BY: T.W. Henniger

for N.S.D.H.

Box 1087, Halifax, N.S.

	ppm	epm		
Calcium	18.59	0.928	Alkalinities –Phenolphthalein as $CaCO_3$ –Methyl Orange as $CaCO_3$	 0 48
Magnesium	7.20	0.592		
Sodium	6.05	0.263	Hardness (Total as $CaCO_3$)	72.0
Iron Total	0.02	0.001	Loss on Ignition (1 hr. @ 500°C)	
Manganese Total	T	-	Total Dissolved Solids	
Sulphate	8	0.167	Suspended Matter	
Chloride	13.30	0.375	Specific Conductance (mhos. x 10^{-5})	18
Nitrate	T	-	pH Value	7.1
			Color	<5
			Turbidity	0

REMARKS:

Ca - TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Cu - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: Oct. 8, 1969

ANALYSED BY: J B Harnish

46044/4

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Wolfville

DATE SAMPLED: Sept. 30, 1969

DATE RECEIVED: 6/10/69

IDENTIFICATION MARK: #4

SAMPLED BY: Keith Davidson

SUBMITTED BY: T.W. Henniger for N.S.D.M.

Box 1087, Halifax, N.S.

	ppm	epm		
Calcium	17.95	0.896	Alkalinities -Phenolphthalein as $CaCO_3$ -Methyl Orange as $CaCO_3$	 0 48
Magnesium	6.81	0.560		
Sodium	6.17	0.268	Hardness (Total as $CaCO_3$)	72.80
Iron Total	0.02	0.001	Loss on Ignition (1 hr. @ 500°C)	
Manganese Total	T	-	Total Dissolved Solids	
Sulphate	8	0.167	Suspended Matter	
Chloride	13.30	0.375	Specific Conductance (mhos. x 10^{-5})	18
Nitrate	T	-	pH Value	7.0
			Color	<5
			Turbidity	0

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: October 8, 1969

ANALYSED BY: J B Harnish

46719/5

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Wolfville Test Well

DATE SAMPLED: Oct. 3, 1969 - 5:00 P.M.

DATE RECEIVED: 9/1/70

IDENTIFICATION MARK:

SAMPLED BY: Cameron Davison

SUBMITTED BY:

	ppm	epm		
Calcium	16.99	0.848	Alkalinities	
			–Phenolphthalein as $CaCO_3$	0
Magnesium	4.09	0.336	–Methyl Orange as $CaCO_3$	44
Sodium	6.0	0.261	Hardness (Total as $CaCO_3$)	58.4
Iron Total	T	-	Loss on Ignition (1 hr. @500°C)	
Manganese Total	T	-	Total Dissolved Solids	
Sulphate	7	0.15	Suspended Matter	
Chloride	12.77	0.360	Specific Conductance (mhos. x 10^{-5})	19
Nitrate	T	-	pH Value	7.4
			Color	<5
			Turbidity	0

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m.).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m.).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: Jan. 21, 1970

ANALYSED BY: A.H. Cockburn

J. E. Milligan

46719/1

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION:

DATE SAMPLED: Oct. 9, 1969 - 2:00 P.M.

DATE RECEIVED: 9/1/70

IDENTIFICATION MARKS:

SAMPLED BY: Cameron Davison

SUBMITTED BY:

	ppm	epm		
Calcium	17.31	0.864	Alkalinities -Phenolphthalein as $CaCO_3$ -Methyl Orange as $CaCO_3$	 0 46
Magnesium	4.57	0.376		
Sodium	5.6	0.244	Hardness (Total as $CaCO_3$)	61.2
Iron Total	0.01	0.0005	Loss on Ignition (1 hr. @ 500°C)	
Manganese Total	T	-	Total Dissolved Solids	
Sulphate	6	0.125	Suspended Matter	
Chloride	14.72	0.415	Specific Conductance (mhos. x 10^{-5})	19
Nitrate	T	-	pH Value	7.5
			Color	<5
			Turbidity	0

REMARKS: Test well

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: Jan. 21, 1970

ANALYSED BY: D.H. Cockburn
J E Millington

46719/3

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Wolfville Test Well

DATE SAMPLED: Oct. 17, 1969 - 3:00 P.M.

DATE RECEIVED: 9/1/70

IDENTIFICATION MARK:

SAMPLED BY: C Keith Davidson

SUBMITTED BY:

	ppm	epm		
Calcium	16.35	0.816	Alkalinities -Phenolphthalein as $CaCO_3$ -Methyl Orange as $CaCO_3$	 0 42
Magnesium	4.86	0.40		
Sodium	5.3	0.231	Hardness (Total as $CaCO_3$)	60.0
Iron Total	0.01	0.0005	Loss on Ignition (1 hr. @500°C)	
Manganese Total	T	-	Total Dissolved Solids	
Sulphate	6	0.125	Suspended Matter	
Chloride	16.13	0.455	Specific Conductance (mhos. x 10^{-5})	19
Nitrate	T	-	pH Value	7.5
			Color	<5
			Turbidity	0

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: Jan. 21, 1970

ANALYSED BY: D.H. Cockburn

J.E. Milligan

46719/L

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Wolfville Test Well

DATE SAMPLED: Oct. 24, 1969 - 8.30 A.M.

DATE RECEIVED: 9/1/70

IDENTIFICATION MARK:

SAMPLED BY: Keith Davidson

SUBMITTED BY:

	ppm	epm		
Calcium	26.67	0.832	Alkalinities - Phenolphthalein as $CaCO_3$ - Methyl Orange as $CaCO_3$	 0 48
Magnesium	4.57	0.376		
Sodium	5.65	0.246	Hardness (Total as $CaCO_3$)	59.6
Iron Total	0.01	0.005	Loss on Ignition (1 hr. @ 500°C)	
Manganese Total	T	-	Total Dissolved Solids	
Sulphate	6	0.125	Suspended Matter	
Chloride	12.41	0.390	Specific Conductance (mhos. x 10^{-5})	19
Nitrate	T	-	pH Value	7.5
			Color	<5
			Turbidity	0

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: Jan. 21, 1970

ANALYSED BY: D.H. Cockburn

J.E. Dillinger

1:6719/6

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Wolfville Test Well

DATE SAMPLED: Nov. 7, 1969 - 3:00 P.M.

DATE RECEIVED: 9/1/70

IDENTIFICATION MARK:

SAMPLED BY: Cameron Davison

SUBMITTED BY:

	ppm	epm		
Calcium	16.99	0.848	Alkalinities -Phenolphthalein as $CaCO_3$ -Methyl Orange as $CaCO_3$	0 44.8
Magnesium	4.38	0.360		
Sodium	5.35	0.233	Hardness (Total as $CaCO_3$)	59.6
Iron Total	T	-	Loss on Ignition (1 hr. @ 500°C)	
Manganese Total	T	-	Total Dissolved Solids	
Sulphate	6	0.125	Suspended Matter	
Chloride	12.41	0.350	Specific Conductance (mhos. x 10^{-5})	19
Nitrate	T	-	pH Value	7.5
			Color	45
			Turbidity	0

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTED TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Fe - T DENOTED TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: Jan. 21, 1970

ANALYSED BY: D.H. Cockburn

J.E. Milligan

46719/2

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Wolfville Test Well

DATE SAMPLED: Nov. 14, 1969 - 2:30 P.M.

DATE RECEIVED: 9/1/70

IDENTIFICATION MARK:

SAMPLED BY: Cameron Davison

SUBMITTED BY:

	ppm	epm		
Calcium	18.12	0.904	Alkalinities –Phenolphthalein as $CaCO_3$ –Methyl Orange as $CaCO_3$	 0 46
Magnesium	5.45	0.448		
Sodium	5.99	0.261	Hardness (Total as $CaCO_3$)	66.8
Iron Total	0.01	0.0005	Loss on Ignition (1 hr. @ 500°C)	
Manganese Total	T	-	Total Dissolved Solids	
Sulphate	6	0.125	Suspended Matter	
Chloride	14.18	0.40	Specific Conductance (mhos. x 10^{-5})	19
Nitrate	T	-	pH Value	7.5
			Color	<5
			Turbidity	0

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: Jan. 22, 1970

ANALYSED BY: D.H. Cockburn

J.E. Milligan

46729/7

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Wolfville Test Well

DATE SAMPLED: Dec. 31, 1969 - 1:00 P.M.

DATE RECEIVED: 9/1/70

IDENTIFICATION MARK:

SAMPLED BY: Cameron Davison

SUBMITTED BY:

	ppm	epm		
Calcium	16.99	0.848	Alkalinities -Phenolphthalein as $CaCO_3$ -Methyl Orange as $CaCO_3$	 0 42
Magnesium	4.96	0.408		
Sodium	4.95	0.215	Hardness (Total as $CaCO_3$)	62.0
Iron Total	T	-	Loss on Ignition (1 hr. @ 500°C)	
Manganese Total	T	-	Total Dissolved Solids	
Sulphate	7	0.15	Suspended Matter	
Chloride	14.18	0.40	Specific Conductance (mhos. x 10^{-5})	19
Nitrate	T	-	pH Value	7.1
			Color	<5
			Turbidity	0

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: Jan. 22, 1970

ANALYSED BY: D.H. Cockburn
J.E. Milligan

46821/1

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Town of Wolfville

Test well

IDENTIFICATION MARK:

SUBMITTED BY:

DATE SAMPLED: 10 Jan. '70 10:00 a.m.

DATE RECEIVED:

SAMPLED BY: Murray Morine

	ppm	epm		
Calcium	15.71	0.784	Alkalinities –Phenolphthalein as $CaCO_3$ –Methyl Orange as $CaCO_3$	 0 40.8
Magnesium	9.24	0.760		
Sodium	5.25	0.228	Hardness (Total as $CaCO_3$)	76.4
Iron Total	0.01	0.0004	Loss on Ignition (1 hr. @ 500°C)	
Manganese Total	T	–	Total Dissolved Solids	
Sulphate	10	0.208	Suspended Matter	
Chloride	15.96	0.450	Specific Conductance (mhos. x 10^{-5})	20
Nitrate	2	0.0323	pH Value	7.1
			Color	5
			Turbidity	0

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Pb - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Cu - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: 6:2:70

ANALYSED BY:

46821/2

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Town of Wolfville

Test Well

IDENTIFICATION MARK:

SUBMITTED BY:

DATE SAMPLED: 17 Jan. '70 11:30 p.m.

DATE RECEIVED:

SAMPLED BY: Cameron Davison

	ppm	epm		
Calcium	22.76	1.136	Alkalinities –Phenolphthalein as $CaCO_3$ –Methyl Orange as $CaCO_3$	 0 41.2
Magnesium	1.56	0.128		
Sodium	5.35	0.232	Hardness (Total as $CaCO_3$)	62.4
Iron Total	0.01	0.0004	Loss on Ignition (1 hr. @ 500°C)	
Manganese Total	T	–	Total Dissolved Solids	
Sulphate	8	0.167	Suspended Matter	
Chloride	16.31	0.460	Specific Conductance (mhos. x 10^{-5})	20
Nitrate	2	0.0323	pH Value	7.1
			Color	<5
			Turbidity	0

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: 6:2:70

ANALYSED BY:

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

LOCATION: Town of Wolfville

Test well

IDENTIFICATION MARK:

SUBMITTED BY:

DATE SAMPLED: 20 Jan. 1970 8:15 a.m.

DATE RECEIVED:

SAMPLED BY: Cameron Davison

	ppm	epm		
Calcium	16.83	0.840	Alkalinities –Phenolphthalein as $CaCO_3$ –Methyl Orange as $CaCO_3$	0 40.0
Magnesium	5.35	0.440		
Sodium	5.10	0.222	Hardness (Total as $CaCO_3$)	63.2
Iron Total	0.01	0.0004	Loss on Ignition (1 hr. @500°C)	
Manganese Total	T	–	Total Dissolved Solids	
Sulphate	10	0.208	Suspended Matter	
Chloride	15.25	0.430	Specific Conductance (mhos. x 10^{-5})	20
Nitrate	1	0.0161	pH Value	7.1
			Color	5
			Turbidity	0

REMARKS:

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
Mn - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: 6:2:70 ANALYSED BY:

Wolfville 6-Month Pumping test

Available Water-Level Records
for
Pumping Well
August 19, 1969 - January 20, 1970

(For detailed water-level records of observations wells see water-level recorder records on file at the N.S. Department of Mines.)

DEPT. OF MINES NOVA SCOTIA – Groundwater Division

WATER LEVEL MEASUREMENTS (FIELD)

TEST CONDUCTED BY: Town of Wolfville MEASURED BY:

LOCATION OF PROJECT Wolfville WELL LOCATION:

STATUS Pumping (pumping or observation well) R = (distance from pumping well in feet and direction) DATE Aug. 19/69 PAGE 1

Date August	Time hrs. & mins.	Elapsed time in mins.	Tape Reading at Meas. Point	Tape Reading at Water level	Depth to water in feet	Draw-down in feet	Q = discharge gals/min		REMARKS (i.e. pump adjustments, water temp. static levels, etc.)
19th	1:30 p.m.	0			16:02			CD	
	1:31	1			16:05			CD	
	1:32	2			16:05			CD	
	1:33	3			16:02			CD	
	1:34	4			15:80			CD	
	1:35	5			15:75			CD	
	1:36	6			15:69			CD	
	1:37	7			15:64			CD	
	1:38	8			15:61			CD	
	1:39	9			15:60			CD	
	1:40	10			15:58			CD	
	1:45	15			15:53			CD	
	1:50	20			15:50			CD	
	1:55	25			15:48			CD	
	2:00	30			15:43			CD	
	2:10	40			15:40			CD	
	2:20	50			15:38			CD	
	2:30	60			15:38			CD	
	2:45	75			15:35			CD	
	3:00	90			15:33			CD	
	3:15	105			15:31			CD	
	3:30	120			15:27			CD	
	4:00	150			15:23			CD	
	4:30	180			15:22			CD	

DEPT. OF MINES NOVA SCOTIA – Groundwater Division

WATER LEVEL MEASUREMENTS (FIELD)

TEST CONDUCTED BY: Town of Wolfville MEASURED BY:

LOCATION OF PROJECT Wolfville WELL LOCATION:

STATUS Pumping (pumping or observation well) R – (distance from pumping well in feet and direction) DATE PAGE 2

Date	Time hrs. & mins.	Elapsed time in mins.	Tape Reading at Meas. Point	Tape Reading at Water level	Depth to water in feet	Draw-down in feet	Q = discharge gals/min		REMARKS (i.e. pump adjustments, water temp. static levels, etc.)
	5:00	210			15:20			CD	
	5:30	240			15:17			CD	
	6:30	300			15:15			CD	
	7:30	360			15:13			CD	
	8:30	420			15:13			CD	
	9:30	480			15:13			B.A.	
	10:30	540			15:13			B.A.	
	11:30	600			15:14			B.A.	
	12:30	660			15:14			B.A.	
August 20	1:30 A.M.	720			15:14			B.A.	
	3:30	840			15:13			B.A.	
	5:30	960			15:05			A.C.	
	7:30	1080			15:02			A.C.	
	9:30	1100			15:00			A.C.	
	11:30	1220			15:00			A.C.	
	1:30 P.M.	1340			15:08			C.D.	
	5:30	1580			15:00			C.D.	
	9:30	1820			14:95			A.C.	
August 21	1:30 A.M.	2060			14:93			A.C.	
	7:30	2420			14:87			A.C.	

DEPT. OF MINES NOVA SCOTIA – Groundwater Division

WATER LEVEL MEASUREMENTS (FIELD)

TEST CONDUCTED BY: Town of Wolfville MEASURED BY:

LOCATION OF PROJECT Wolfville WELL LOCATION: Wolfville

STATUS Pumping (pumping or observation well) R – (distance from pumping well in feet and direction) DATE Aug.21/69 PAGE 1

Date	Time hrs. & mins.	Elapsed time in mins.	Tape Reading at Meas. Point	Tape Reading at Water level	Depth to water in feet	Draw-down in feet	Q – discharge gals/min		REMARKS (i.e. pump adjustments, water temp. static levels, etc.)
August 21	3:00 p.m.	0			27:75				
	3:01	1			20:61				
	3:02	2			20:61				
	3:03	3			19:19				
	3:04	4			19:39				
	3:05	5			19:30				
	3:06	6			19:02				
	3:07	7			19:24				
	3:08	8			19:28				
	3:09	9			19:20				
	3:10	10			19:48				
	3:15	15			19:34				
	3:20	20			19:48				
	3:25	25			19:28				
	3:30	30			19:39				
	3:40	40			19:32				
	3:50	50			19:44				
	4:00	60			19:65				
	4:15	75			25:14				

DEPT. OF MINES NOVA SCOTIA – Groundwater Division

WATER LEVEL MEASUREMENTS (FIELD)

TEST CONDUCTED BY: _____ MEASURED BY: _____

LOCATION OF PROJECT Wolfville WELL LOCATION: Wolfville

STATUS Pumping (pumping or observation well) R – _____ (distance from pumping well in feet and direction) DATE Aug.21/69 PAGE 1

Date Aug.	Time hrs. & mins.	Elapsed time in mins.	Tape Reading at Meas. Point	Tape Reading at Water level	Depth to water in feet	Draw-down in feet	Q = discharge gals/min		REMARKS (i.e. pump adjustments, water temp. static levels, etc.)
21	4:20 p.m.	0			15:58				
	4:21	1			15:45				
	4:22	2			15:30				
	4:23	3			15:26				
	4:24	4			15:20				
	4:25	5			15:15				
	4:26	6			15:11				
	4:27	7			15:09				
	4:28	8			15:06				
	4:29	9			15:04				
	4:30	10			15:02				
	4:35	15			15:00				
	4:40	20			14:98				
	4:45	25			14:94				
	4:50	30			14:92				
	5:00	40			14:84				

DEPT. OF MINES NOVA SCOTIA – Groundwater Division

WATER LEVEL MEASUREMENTS (FIELD)

TEST CONDUCTED BY: Town of Wolfville MEASURED BY: Cameron Davison

LOCATION OF PROJECT Wolfville WELL LOCATION: Wolfville

STATUS Pumping (pumping or observation well) R — (distance from pumping well in feet and direction) DATE PAGE

Date	Time hrs. & mins.	Elapsed time in mins.	Tape Reading at Meas. Point	Tape Reading at Water level	Depth to water in feet	Draw-down in feet	Q — discharge gals/min		REMARKS (i.e. pump adjustments, water temp. static levels, etc.)
Dec.29/69									
"	8:15 a.m.				30.46		319.5 g/m		
"	5:00 p.m.				30.52		"		
Dec.30/69	8:15 a.m.				30.65		"		
"	5:00 p.m.				30.64		"		
Dec.31/69	8:15 a.m.				30.74		"		
"	5:00 p.m.				30.66		"		
Jan.2/70	8:15 a.m.				30.65		"		
"	5:00 p.m.				30.86		"		
Jan.3/70	8:15 a.m.				30.96		"		
Jan.5/70	8:15 a.m.				30.76		"		
"	5:00 p.m.				30.90		"		
Jan.6/70	8:15 a.m.				30.90		"		
Jan.6/70	5:00 p.m.				30.78		"		
Jan.7/70	8:15 a.m.				30.75		"		
"	5:00 p.m.				30.89		"		
Jan.8/70	8:15 a.m.				30.68		"		
"	5:00 p.m.				30.64		"		
Jan.9/70	8:15 a.m.				30.63		"		
"	5:00 p.m.				30.67		"		
Jan.12/70	8:15 a.m.				30.90		"		
"	5:00 p.m.				30.87		"		
Jan.13/70	8:15				30.89		"		
"	5:00 p.m.				30.80		"		

DEPT. OF MINES NOVA SCOTIA – Groundwater Division

WATE LEVEL MEASUREMENTS (FIELD)

TEST CONDUCTED BY: Town of Wolfville MEASURED BY:

LOCATION OF PROJECT Wolfville WELL LOCATION: Wolfville

STATUS Pumping (pumping or observation well) P — (distance from pumping well in feet and direction) DATE PAGE

Date	Time hrs. & mins.	Elapsed time in mins.	Tape Reading at Meas. Point	Tape Reading at Water level	Depth to water in feet	Draw-down in feet	Q — discharge gals/min		REMARKS (i.e. pump adjustments, water temp. static levels, etc.)
Jan.14/70	8:15 a.m.				30.55		319.5 g/m		
"	5:00 p.m.				30.56		"		
Jan.15/70	8:15 a.m.				30.60		"		
"	5:00 p.m.				30.78		"		
Jan.16/70	8:15 a.m.				31.04		"		
"	5:00 p.m.				31.06		"		
Jan.17/70	8:15 a.m.				31.02		"		
"	5:00 p.m.				30.85		"		
Jan.19/70	8:15 a.m.				31.09		"		
"	5:00 p.m.				31.05		"		
Jan.20/70	8:15 a.m.				30.95		"		Turned pump off 8:50 a.m.
"	10:50 a.m.				15.75		Nil		