MN
R201

hydrogeological
Consultants ltd.

AQUA TECH

SUPPLIES & SERVICES LTD.

November 1, 1994

B.Y.G. Natural Resources Inc.
#208 - 3190 St. John's Street
Port Moody, B.C.
V3H 2C7

Attention: J.B. Smith

Dear Sir:

Re: Mount Nansen Mine Site
Hydrogeological Evaluation

We take this opportunity to enclose two copies of the Hydrogeological Evaluation prepared by Roger Clissold and to thank you for allowing us to be of service to you with the Mount Nansen project.

Once you have had an opportunity to review the enclosed Evaluation, please feel free to call me if you wish to discuss the contents.

Yours truly,

AQUA TECH SUPPLIES & SERVICES LTD.

Per: Bert Albisser

BA:mrc
Enclosures

123 COPPER ROAD, WHITEHORSE, YUKON Y1A 2Z7 (403) 668-5544 FAX (403) 668-7182

Aqua Tech Supplies & Services Ltd.
Nansen Mountain
BYG - Mount Nansen Mine Site
1994 Aquifer Evaluation

Prepared by
hydrogeological consultants ltd.
Our File No.: 94-182

October 1994

PERMIT TO PRACTICE
HYDROGEOLOGICAL CONSULTANTS LTD.
Signature _____
Date 94/10/24
PERMIT NUMBER: P 385
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

hydrogeological consultants ltd.

hydrogeological Consultants ltd.

investigations involving any aspect of **GROUNDWATER**

10704 - 181 street, edmonton, alberta t5s 1k8 — phone (403) 483-7240 fax (403) 484-9413

October 26, 1994

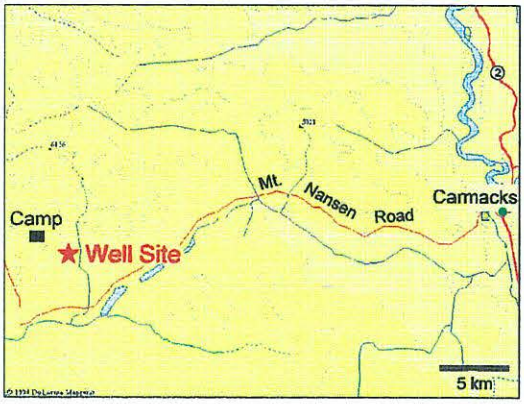
Our File No.: 94-182

Aqua Tech Supplies & Services Ltd.
123 Copper Road
WHITEHORSE, YT
Y1A 2Z7

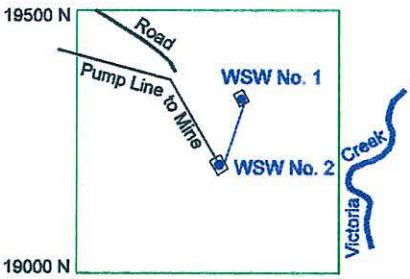
Attn: Bert Albisser

Re: 1994 Aquifer Test - BYG - Mt. Nansen

Thank you for your request to analyze the 1994 aquifer test data from the BYG - Mount Nansen Mine Water Supply Well No. 2. It is my understanding that the water supply well is located on the west side of Victoria Creek, approximately 30 kilometres west of Carmacks YT. The second water supply well (WSW No. 1) on the site could not be used during the present testing program because of an obstruction in the well. The water well driller's reports indicate that permafrost is present to a depth of approximately 25 metres. Water well diagrams prepared from the driller's reports are included in Appendix A.



Index Map



Site Plan

The data available from the WSW No. 2 driller's report indicate that in July 1968 the water well was pumped at 902 cubic metres per day for 36 hours. At the start of the test, the water was flowing from the water well at 65 cubic metres per day. After 36 hours of pumping, the water level was 6.47 metres below the top of the casing. The apparent transmissivity of the aquifer from this data is 212 m^2/day.

AQUA TECH

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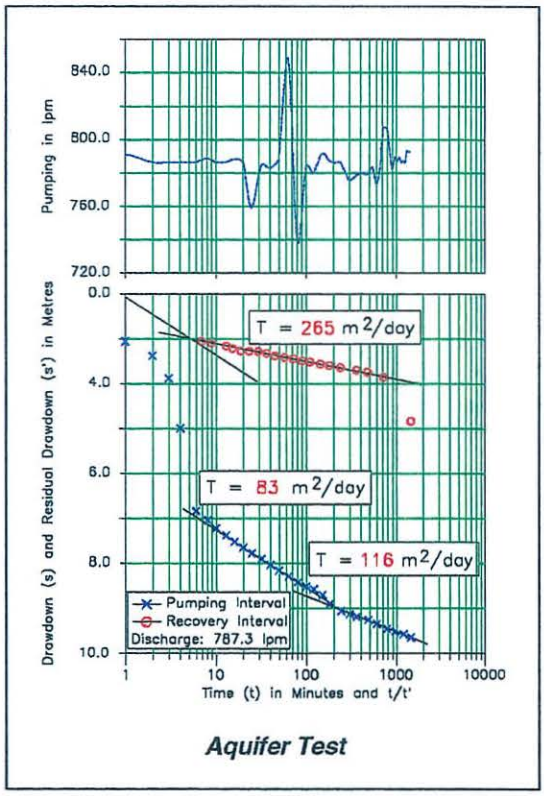
The 1994 aquifer test consisted of 1440 minutes of pumping at an average of 787.3 lpm and 240 minutes of recovery. A plot of the average pumping rate between readings suggests that the discharge varied from a low of 739.6 to a high of 847.8 litres per minute. However, because these variations occurred one after the other, it would appear to be the result of an incorrect value being recorded for total discharge after 64 minutes of pumping rather than a significant change in discharge rate.

During the pumping interval of the test, the water level did not draw down significantly over the first two minutes. After two minutes of pumping, the drawdown was 3.32 metres. Between two and six minutes after pumping started, there was 6.9 metres of drawdown. The sudden increase is not a result of changes in pumping rate but is probably a result of plugging of the water well screen. The plugging would be a result of material moving up against the screen after the cleaning out of the water well.

From six minutes to 190 minutes after pumping started, the water-level decline was relatively constant at 2.5 metres per log cycle, a result of an effective transmissivity of 83 m^2/day. From 240 minutes after pumping started to the end of the pumping interval, the rate of water-level decline slowed, corresponding to an increase in the effective transmissivity.

During the first two minutes of recovery, the water level rose 12.1 metres, more than four times the amount of drawdown in the first two minutes of pumping. The significantly larger rise at the start of recovery than at the start of pumping also indicates that the efficiency of the water well decreased during the pumping interval of the aquifer test. For the entire recovery interval, except for the first two minutes, the water level rose at 0.8 m/log cycle, indicating an effective transmissivity of 265 m^2/day. The recovery data do not project to a full recovery. Projection of the present trend will result in a residual drawdown of 1.44 metres at t/t'=1.



The failure of the water level to project to a full recovery indicates the aquifer is of limited areal extent and does not receive sufficient recharge to behave as an infinite aquifer. Certainly the presence of more than 20 metres of permafrost inhibits local recharge to the aquifer.

A second interpretation of the recovery data is that a boundary to the aquifer is affecting the water-level rise and that a water-level trend indicative of a lower transmissivity would develop. The effective transmissivity would be less than 90 m^2/day.

The results of the present test suggest the aquifer has a transmissivity of 265 m^2/day. The lower values observed during the pumping interval are a result of the screens being partially plugged, causing turbulent flow into the water well proper and resulting in higher energy losses. If the water well was efficient, the drawdown after pumping 787.3 lpm for 10 minutes would be approximately 5 metres, rather than the observed 11.02 metres, if the aquifer had a transmissivity of 265 m^2/day. Extrapolation of the water levels from the first two minutes of pumping indicates the drawdown after 10 minutes of pumping would have been in the order of 6 metres if the well screens had not become plugged.

The aquifer in which the water wells are completed is most likely confined to the valley of Victoria Creek. If the aquifer is 1,000 metres wide and has a storativity of 0.0001, the hydraulic depression caused by pumping would intersect the edges of the aquifer within approximately 7 minutes after pumping started, assuming the water well is positioned in the middle of the valley. Under these conditions, the transmissivity determined from the recovery interval would be an effective transmissivity reflecting the effects of the aquifer boundaries coinciding with the valley walls. To reduce the transmissivity from 265 m^2/day to less than 90 m^2/day, there would have to be two more boundaries to the aquifer. If there were two more boundaries, the aquifer would have boundaries on four sides. The results of the 1968 aquifer test indicate that after 36 hours, a water level for the pumped well can be calculated which agrees closely with the reported water level.

If the transmissivity of the aquifer is in the order of 1,000 m^2/day, if the width of the aquifer is 1000 metres and if the hydraulic gradient in the aquifer is 0.001 metres per metre, then there would be 1,000 cubic metres flowing through the aquifer each day. From the present test results, three are too few data to determine the gradient in the aquifer.

The failure of the water level to have a projected full recovery would suggest that the aquifer is being depleted by the pumping. If the removal of 1134 cubic metres of groundwater results in the lowering of the water level by 1.44 metres, then all else being equal, the aquifer would store 25,000 cubic metres.

The present test data are insufficient to unequivocally determine the long-term yield for the aquifer in which WSW No. 2 is completed. The most limiting interpretation is that the aquifer is of limited areal extent and stores 25,000 cubic metres. This volume of water would provide only a 50-day supply of 500 cubic metres per day. The most optimistic interpretation would be that an efficient water well can be completed in the aquifer and that the aquifer behaves as an infinite aquifer with a transmissivity of 265 m^2/day. Under this condition, the theoretical water well would have a projected long-term yield in excess of 2500 cubic metres per day.

In conclusion, the present data are insufficient to establish a reliable long-term yield for the aquifer. It is our understanding that the water well has been used in the past, but the pumping rate and duration are not known. The 1968 aquifer test summary indicates the water level was higher than at the start of the 1994 aquifer testing and that there were no additional aquifer boundaries encountered with a pumping interval of 36 hours.

It is strongly recommended that additional aquifer tests be performed to provide a higher degree of confidence in the interpretation of the availability of groundwater from the aquifer. The amount of testing would be determined partly by on-site conditions and partly by the importance of a need to have a reliable water supply of 500 cubic metres per day.

I hope this information is satisfactory for your present needs. Thank you once again for the opportunity to provide our services to Aqua Tech Supplies and Services Ltd.

Yours truly,

R. J. Clissold, P. Geol.,
President & Senior Hydrogeologist

1969 - 1994
25
YEARS
Hydrogeological
Consultants Ltd.

APPENDIX A

APPENDIX A

AQUA TECH SUPPLIES & SERVICES LTD.

WATER WELL DETAILS

Water Source Well No. 1

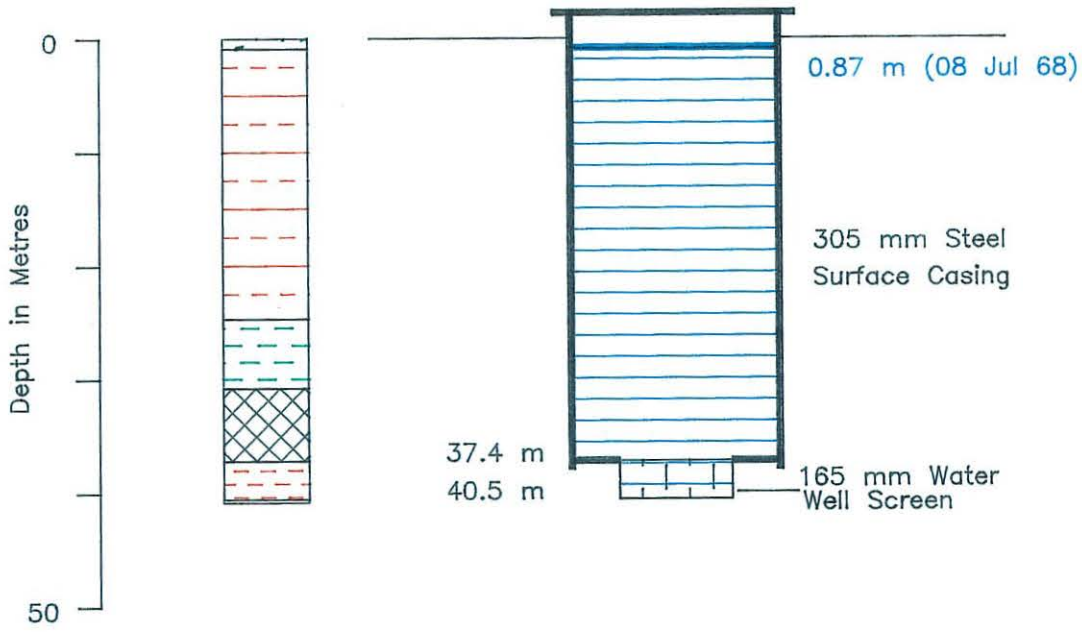
Completion Date: **08 Jul 68**

Total Depth: **40.5m**

Completion:
Water Well Screen from **37.4** to **40.5 m**

Non-Pumping Water Level: **0.87 m** (08 Jul 68)

Depth to Pump Intake: **N/A**



Legend

- Sand Fill
- Clay & Gravel
- Fine to Course Sand & Angular Gravel
- Frozen Silt, Sand & Gravel
- Hard Packed Silt Sand & Gravel

Aqua Tech Supplies & Services Ltd.
Nansen Mountain
BYG – Mount Nansen Mine Site
1994 Aquifer Evaluation

Water Source Well No. 1

Well Diagram

October 1994 Appendix A.

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L:\TRFILE\1994\94-182\WSW1WD 26 Oct 94 (NMZ)

Well Number: *94-182-002* .. ..-..-.. W-M

Well Owner: *BYG Natural Resources Inc*
Address: *VANCOUVER, BC*
Drilling Contractor: *International Water Supply Ltd.*

Utme: Zone:
Utmn: Elevation (AMSL):

GENERAL: Completed Depth: *40.5* Completed On: *08 Jul 68* Well Use: *Industrial*
Type of Work: *New Well* Drilling Method: *Cable Tool*

COMPLETION:
Casing: Depth: *37.2* Size: *304* Type: *Steel*
Liner: Top: Size: Perforated Interval (s):
Bottom: Type:
Screen: Size: *165* Type: *Stainless Steel* Screened Interval (s):

Pump: Model: Type: Pump Intake At:
Testing: NPWL: *0.9* Rate: *570.1* Time: *1800 (minutes)* Drawdown: *17.1*

Depth (BGL)	Elevation (AMSL)	Lithologic Description
0.9		*Sand Fill*
24.7		*Frozen Silt, Sand And Gravel*
30.8		*Clay And Gravel*
37.2		*Hard Packed Silt, Sand And Gravel*
40.5		*Fine To Course Sand And Angular Gra*
40.8		*Bedrock*

Laboratory: **Date Analyzed:**

pH	Aluminum	COD	Total Phosphate	Mercury
Conductivity	Sulphate	SAR	Barium	Molybdenum
TDS	Chloride	Amm. Nitrogen	Beryllium	Nickel
Sodium	Total Alkalinity	TKN	Cadium	Selenium
Potassium	Nitrate&Nitrite N	Nitrate	Chromium	Strontium
Calcium	Fluoride	Nitrite	Cobalt	Vanadium
Magnesium	Iron	TN	Copper	Zinc
Total Hardness	Ion Balance	TC	Lead	Hydroxide
Carbonate	TOC	DIC	Manganese	
Bicarbonate	Silica	Arsenic	Phosphate	

Comments:
Frozen 0.9 to 24.7 m ; Water Source Well No. 1

Units are METRIC. Chemical Constituents are in milligrams per litre (mg/l), except pH (pH units) & Conductivity (µS/cm).

Water Source Well No. 2

Completion Date: **21 Jul 68**

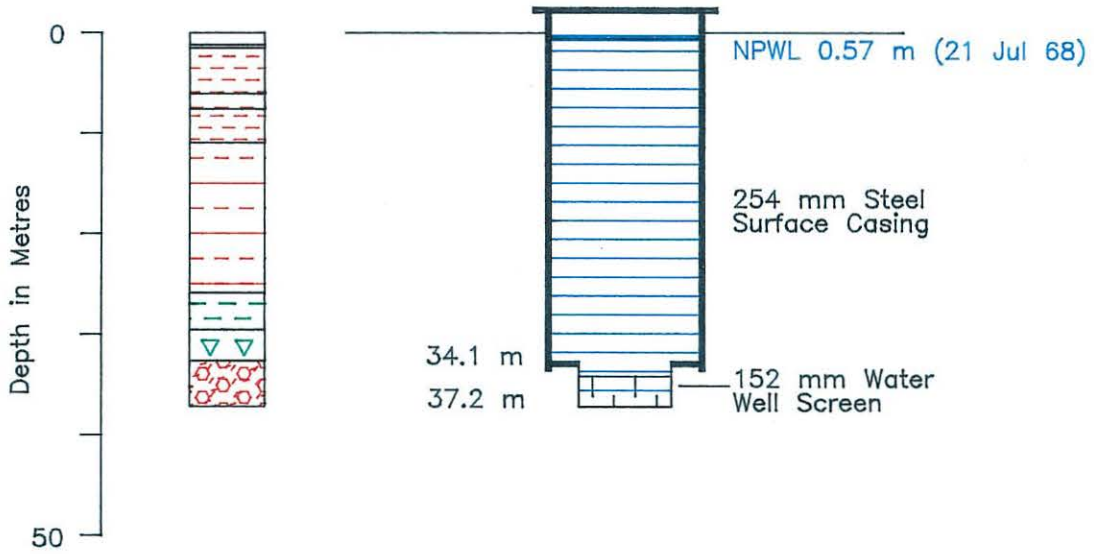
Total Depth: **37.2 m**

Completion:

Water Well Screen from **34.1** to **37.2 m**

Non-Pumping Water Level: **0.57 m** (21 Jul 68)

Depth to Pump Intake: **N/A**



Legend

- Silt & Gravel
- Sand & Gravel
- Clay & Gravel
- Siltstone & Gravel
- Frozen Siltsand & Gravel

Aqua Tech Supplies & Services Ltd. Nansen Mountain BYG – Mount Nansen Mine Site 1994 Aquifer Evaluation
Water Source Well No. 2 Well Diagram
October 1994 Appendix A.

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L:\TRFILE\1994\94-182\WSW2WD 26 Oct 94 (NMZ)

Well Number: *94-182-001*

.. ..-..-.. *W·M*

Well Owner: *BYG Natural Resources Inc*
Address: *VANCOUVER, BC*
Drilling Contractor: *International Water Supply Ltd.*

Utme: Zone:
Utmn: Elevation (AMSL):

GENERAL: Completed Depth: *37.2* Completed On: *21 Jul 68* Well Use: *Industrial*
Type of Work: *New Well* Drilling Method: *Cable Tool*

COMPLETION:
Casing: Depth: *32.9* Size: *254* Type: *Steel*
Liner: Top: *30.5* Size: *165* Perforated Interval (s):
Bottom: *37.2* Type: *Steel*
Screen: Size: *165* Type: *Armco* Screened Interval (s):
Pump: Model: Type: Pump Intake At:
Testing: NPWL: *Flowing* Rate: *629.0* Time:*2160 (minutes)* Drawdown: *6.5*

Depth (BGL)	*Elevation (AMSL)*	*Lithologic Description*
1.2		*Sand*
1.5		*Muskeg*
6.1		*Frozen Silt Sand And Gravel*
7.6		*Silt, Sand And Gravel*
11.0		*Frozen Silt Sand And Gravel*
25.9		*Silt Sand And Gravel*
29.6		*Clay And Gravel*
32.6		*Hard Pack Silt & Gravel*
37.2		*Sand & Gravel*
37.5		*Bedrock*

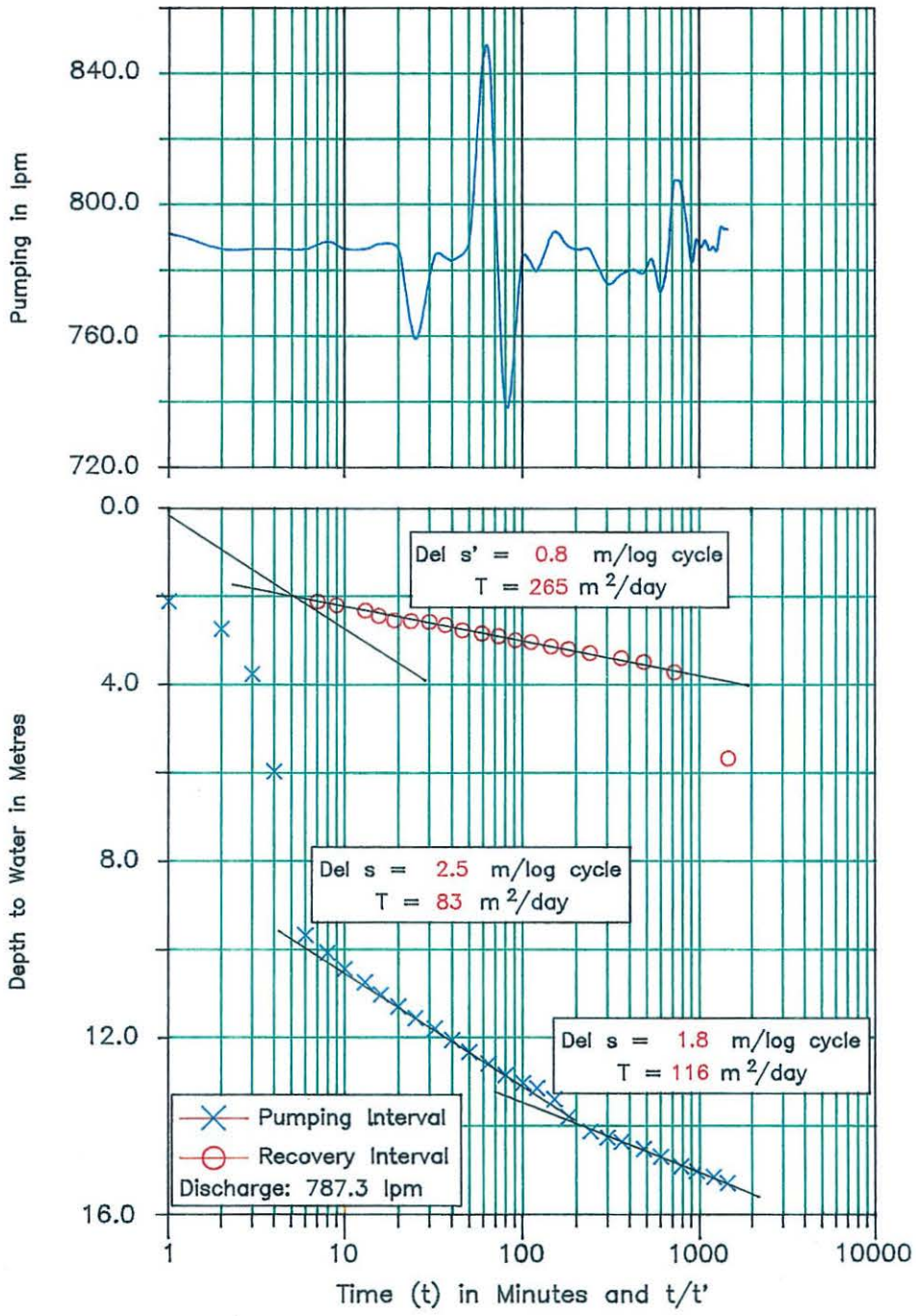
Depth (BGL)	*Elevation (AMSL)*	*Lithologic Description*

Laboratory: **Date Analyzed:**

pH	Aluminum	COD	Total Phosphate	Mercury
Conductivity	Sulphate	SAR	Barium	Molybdenum
TDS	Chloride	Amm. Nitrogen	Beryllium	Nickel
Sodium	Total Alkalinity	TKN	Cadium	Selenium
Potassium	Nitrate&Nitrite N	Nitrate	Chromium	Strontium
Calcium	Fluoride	Nitrite	Cobalt	Vanadium
Magnesium	Iron	TN	Copper	Zinc
Total Hardness	Ion Balance	TC	Lead	Hydroxide
Carbonate	TOC	DIC	Manganese	
Bicarbonate	Silica	Arsenic	Phosphate	

Comments:
Frozen 1.5 to 6.1, 10.7 to 23.2 m ; Water Source Well No. 1

Units are METRIC. Chemical Constituents are in milligrams per litre (mg/l), except pH (pH units) & Conductivity (µS/cm).



Aqua Tech Supplies & Services Ltd. Nansen Mountain BYG – Mount Nansen Mine Site 1994 Aquifer Evaluation
Water Source Well No. 2 Aquifer Test 1
October 1994 Appendix A.

26 Oct 94 (NMZ)

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Aquifer Test I

Pumping & Recovery

Water Source Well No. 2
Manual Measurements

Status	Pumped	Recovery Interval (min)	240
NPWL (m)	0.57	TD (m)	37.2
Discharge (lpm)	787.30	Top of Aquifer (m)	37.2
Date Test Started	07 Sep 94	Depth Casing Set (m)	32.9
Time Test Started (Hrs)	09:30	Depth to Pump Intake (m)	#N/A
Pumping Interval (min)	1440	Measuring Point (m) AGL	#N/A

Pumping Interval

Time (t) Since Pumping Started (minutes)	Depth to Water (metres)	Meter Reading (cubic metres)
0.5	1.52	0.4
1	2.69	0.8
2	3.32	1.6
3	4.34	2.4
4	6.55	3.2
6	10.25	4.7
8	10.65	6.3
10	11.02	7.9
13	11.32	10.2
16	11.60	12.6
20	11.87	15.7
25	12.13	19.5
32	12.37	25.0
40	12.63	31.3
50	12.90	39.2
64	13.16	51.0
80	13.42	62.9
100	13.60	78.6
120	13.72	94.2
150	13.97	117.9
180	14.37	141.5
210	14.55	165.1
240	14.70	188.7
300	14.84	235.3
360	14.94	282.0
420	15.02	328.8
480	15.10	375.5
540	15.18	422.5
600	15.27	469.0
660	15.35	516.0
720	15.46	564.4
780	15.49	612.8
840	15.52	660.6
900	15.58	707.5
960	15.60	754.9
1020	15.63	802.1
1080	15.67	849.4
1140	15.70	896.6
1200	15.73	943.8
1260	15.76	991.0
1320	15.79	1038.6
1380	15.83	1086.1
1440	15.87	1133.7

Recovery Interval

Time (t') Since Pumping Stopped (minutes)	(t/t')	Depth to Water (metres)
0.5	2881	#N/A
1	1441	5.70
2	721	3.72
3	481	3.49
4	361	3.41
6	241	3.28
8	181	3.20
10	145	3.14
13	112	3.05
16	91.0	2.99
20	73.0	2.90
25	58.6	2.83
32	46.0	2.78
40	37.0	2.66
50	29.8	2.59
64	23.5	2.57
80	19.0	2.55
100	15.4	2.45
120	13.0	2.33
150	10.6	2.25
180	9.0	2.19
210	7.9	2.14
240	7.0	2.12

#N/A = Information Not Available